

the illness of his mother, he therefore must cooperate with others by correspondence. Not long ago he wrote out an interesting lecture on snow crystals and sent it with many lantern slides to a friend at the Brooklyn Institute of Arts and Sciences, where the lecture was delivered with great success. This suggests that other instructors, lecturers, lyceums, etc., may also secure material for an interesting lecture on a new topic and thus interest the public in meteorological matters. We hope that the State superintendents of schools will take this matter up officially as a proper branch of nature study in school work.

PHYSICAL SOCIETIES AND JOURNALS.

Many of the readers of the MONTHLY WEATHER REVIEW are deeply interested in those branches of the study of mathematics and physics that bear on meteorology, and desire to keep in close touch with the progress of our knowledge along these lines. This can be best accomplished by becoming an associate member of either the American Physical Society, the American Mathematical Society, or the Astrophysical Society. The first named offers special advantages, since its members receive Science Abstracts and the Physical Review regularly. These monthly periodicals bring to one's attention much of what is new in physical science. Those who wish further details should correspond with the Editor, or with the secretary of the American Physical Society, Prof. Ernest Merritt, Cornell University, Ithaca, N. Y.

A journal of scientific news is as essential to the student as a daily paper is to the business man. It would be convenient if all meteorological matters were published in one journal, but this has never yet been done, and one must read several in order to compass the field. The more important periodicals are the following:

IN ENGLISH.

American Journal of Science, New Haven.
 Astrophysical Journal, Chicago.
 Proceedings of the Royal Society, London.
 Quarterly Journal of the Royal Meteorological Society, London.
 Science, New York.
 Symons's Meteorological Magazine, London.
 Science Abstracts, London.
 London, Edinburgh, and Dublin Philosophical Magazine.
 Scottish Meteorological Magazine, Edinburgh.
 Terrestrial Magnetism and Atmospheric Electricity, Baltimore.
 Nature, London.
 Physical Review, Lancaster.

IN FRENCH.

Annuaire de la Société Météorologique de France, Paris.
 Archives des Sciences Physiques et Naturelles, Genève.
 Bulletin de la Société Belge d'Astronomie, Bruxelles.
 Comptes Rendus de l'Académie des Sciences, Paris.

IN GERMAN.

Annalen der Hydrographie und Maritimen Meteorologie, Berlin.
 Physikalische Zeitschrift, Leipzig.
 Gaea, Leipzig.
 Das Wetter, Berlin.
 Meteorologische Zeitschrift, Wien.
 Naturwissenschaftliche Rundschau, Berlin.
 Annalen der Physik, Leipzig.

COLD AND HEAT.

The following inquiry, which seems to be going the round of the press in the West, has been forwarded to the Chief of

the Weather Bureau with a request for an authoritative answer:

"How cold is it when it is twice as cold as two degrees above zero (Fahrenheit)?"

The expression "twice as cold" has no definite meaning and is not used in scientific language nor in rational popular English. We simply say "warmer" for more heat and "colder" for less heat.

It is customary to measure the condition of bodies only with respect to heat, not cold. The scale by which the relative hotness of bodies is measured is the scale of temperature, the starting point of which is the temperature at which the molecular vibrations that constitute heat cease. This point is called the absolute zero of temperature. The absolute zero of temperature is 459° below zero (-459°) on the Fahrenheit scale, at which temperature a body has no heat and is said to be at 0° on the absolute scale of temperature.

A body at $+2^{\circ}$ F. may therefore be said to have 461 Fahrenheit degrees of temperature on the absolute scale. "Twice as cold" might be considered to mean one-half as hot. If so, then anything that is twice as cold as something at 2° F. must have one-half of 461 degrees of temperature, or 230.5 degrees. The temperature on the Fahrenheit scale of a body having 230.5 degrees of temperature on the absolute scale is $-459^{\circ} + 230.5^{\circ} = -228.5^{\circ}$, or 228.5° below zero Fahrenheit.

It is not possible to say anything more definite than this, as the expression "twice as cold" can have no real significance until a scale for measuring cold has been adopted. Heat is measured upward from the absolute zero of heat, but cold must be measured downward from some arbitrary point that has never yet been defined.

METEORS: THEIR INCANDESCENCE AND THEIR NOISE.

In Nature for October 19, 1905, Mr. George A. Brown suggests that the incandescence of shooting stars has an electrical origin, or that the heat evolved is due to the passage of the meteor across the lines of force in the earth's magnetic field. To this Prof. A. S. Herschel replies that although such induced electric currents must exist, yet the heating effect must be extremely small and incomparably subordinate to the heat evolved by the adiabatic compression of the air against the front surface of the meteor. He calculates that—

If the kinetic energy of translation in foot pounds of one pound of air at the meteor's velocity be divided by 330, the number thus obtained, 1,180,620, will be the number of centigrade degrees through which the air will be heated by the pure process of compression. This relates to the air in immediate contact with the front of the meteor, and lower temperatures would prevail in the layers outside of that.

He thinks that the induced electric and magnetic phenomena are unimportant for both the stony and the metallic meteors as compared with these enormous thermal effects, but he seems to suggest that electricity may explain the long enduring bright streaks left along the paths of all the brighter shooting stars and larger meteors.

The compression of the air in front of the meteor takes place so rapidly, owing to the great speed of the meteorite, that the gas has no time to dissipate in front or to spread out on all sides. It is compressed and intensely heated by the impact, but remains a perfect, frictionless, elastic fluid. Within this small mass of heated air the speeds of the sound waves differ from the speed of flow of air itself in proportions or ratios that diminish asymptotically toward the ultimate ratio

$\frac{1}{\sqrt{5}}$. Within this mass of hot air are sound waves conveying the strokes and shocks of the collisions to and fro between the meteor's center and the surrounding quiet air. Such sounds begin, travel, and end within the moving field of heated, compressed air as if it were at rest, although really